

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 30

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* HIDEO SHIMIZU

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Appeal No. 94-1889  
Application 07/890,003<sup>1</sup>

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ON BRIEF

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Before GARRIS, PAK, and OWENS, *Administrative Patent Judges*.  
OWENS, *Administrative Patent Judge*.

*DECISION ON APPEAL*

This is an appeal from the examiner's rejection of claims 1-7, which are all of the claims in the application. Claim 1 is illustrative and reads as follows:

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<sup>1</sup> Application for patent filed May 29, 1992.

1. A phase-shifting mask, comprising:

a phase shifting portion means for shifting a phase of a transmission light lying on both one surface and another surface of a transparent substrate, the two surfaces being at opposite sides of the substrate, and each of the phase shifting portion means projecting outwardly from each respective surface.

#### *THE REFERENCES*

Okamoto	5,045,417	Sep. 3, 1991
Levenson	0 090 924	Oct. 12, 1983
(European patent application)		
Shigetomi et al. (Shigetomi) <sup>2</sup>	4-316047	Nov. 6, 1992
(Japanese Kokai patent publication)		

#### *THE REJECTIONS*

Claims 1-7 stand rejected under 35 U.S.C. ' 103 as being unpatentable over Okamoto in view of Levenson and over Shigetomi in view of Okamoto.

#### *OPINION*

We have carefully considered all of the arguments advanced by appellant and the examiner and agree with appellant that the aforementioned rejections are not well founded. Accordingly, these rejections will be reversed.

Appellant's claimed invention, as it is most broadly recited in claim 1, is a phase-shifting mask having phase-shifting

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<sup>2</sup> The November 6, 1992 publication date of Shigetomi is subsequent to appellant's May 29, 1992 filing date. Shigetomi therefore is not prior art as to appellant's claimed invention. We nevertheless address the rejection over Shigetomi and Okamoto in order to dispose of this rejection as to its merits.

Citations herein to Shigetomi are to an English translation of this reference. A copy of this translation is provided to appellant with this decision.

portions which lie on and project outwardly from opposite surfaces of a transparent substrate.

*Rejection over Okamoto in view of Levenson*

Okamoto discloses various masks having phase-shifting portions which project outwardly from one surface of a transparent substrate (see, e.g., Figs. 1, 4 and 14). Okamoto does not disclose phase-shifting portions on more than one side of the substrate.

To remedy this deficiency, the examiner relies upon Levenson. This reference discloses a mask having phase-shifting portions and teaches that A[t]he transparent material [i.e., phase-shifting portions] may be either over or under every other transmitting region of the mask@ (sixth page).

The examiner argues (answer, page 3):

Levenson teaches that the phase shifting portion may be on either side of the substrate. Okamoto or Levenson do not teach phase shifting portions on both sides of the substrate. It would have been obvious to one of ordinary skill in the art to produce phase shifters on both sides of the substrate because of the suggestion of Levenson to put shifters on either side of the substrate and because of the expected and predictable results of the optical properties of such phase shifting masks.

Appellant argues that Levenson discloses that the phase-shifting material is either over or under every other

transmitting region of the mask, and that this is a teaching directly away from providing phase-shifting portions on opposite surfaces of the transparent substrate (brief, page 5).

In order for a *prima facie* case of obviousness to be established, the teachings from the prior art itself must appear to have suggested the claimed subject matter to one of ordinary skill in the art. See *In re Rinehart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976). The mere fact that the prior art could be modified as proposed by the examiner is not sufficient to establish a *prima facie* case of obviousness. See *In re Fritsch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). The examiner must explain why the prior art would have suggested to one of ordinary skill in the art the desirability of the modification. *Id.* at 1266, 23 USPQ2d at 1783-84.

In the present case, the examiner asserts that a teaching of placing phase-shifting material on either side of a substrate, together with ~~A~~the expected and predictable results of the optical properties of such phase shifting masks~~@~~, would have suggested, to one of ordinary skill in the art, placing phase-shifting material on both sides of the substrate (answer, page 3). The examiner does not explain, and it is not apparent to us, what ~~A~~expected and predictable results of the optical properties~~@~~

is intended to mean. Also, the examiner does not explain why any such expected and predictable results, in combination with the references relied upon by the examiner, would have motivated one of ordinary skill in the art to modify the teachings of the references such that a mask is made which has phase-shifting material on both sides of a substrate.

Accordingly, we conclude that the examiner has not carried his burden of establishing a *prima facie* case of obviousness of appellant's claimed invention over Okamoto and Levenson. We therefore reverse the rejection of claims 1-7 under 35 U.S.C. ' 103 over these references.

*Rejection over Shigetomi in view of Okamoto*

Shigetomi discloses a phase-shifting mask which has a U-shaped section cut out of the substrate on the side opposite to each phase-shifting portion so that the intensity of light through the phase-shifting portion and substrate is that same as that through the substrate alone in places where there is no phase-shifting portion (page 1).

The examiner argues (answer, page 3):

Shigetomi teaches that the shifter on the ~~A~~backside of the substrate is a trench cut into the substrate that acts as a phase shift portion. It would have been obvious to one of ordinary skill in the art to use the same type of phase shift portions because of the equal

effect of shifter portions and the known equivalent effects of such shifter portions (see Okamoto).

The examiner further argues (supplemental answer, pages 5-6) that

it is well known to change light intensity through the use of phase shifters in many different positions (Okamoto). Therefore, it would have been obvious to one of ordinary skill in the art to use phase shifters in any position including the bottom of the substrate with expectation of phase shifting because of the known use of phase shifting and changing light intensity from the bottom of the substrate.

As correctly pointed out by appellant (reply brief, paper no. 19, page 2 of remarks section), Shigetomi's U-shaped sections cut out of the substrate are not disclosed as providing phase shifting as asserted by the examiner, but, rather, are disclosed only as equalizing the intensity of the transmitted light.

Okamoto teaches that both applying phase-shifting material to a substrate and cutting sections out of the substrate are effective for providing phase shifting (col. 12, lines 52-54). The purpose of the cut-out sections of Shigetomi's substrate, however, is to equalize the intensity of the light transmitted through the phase-shifting sections and the non-phase-shifting sections of the mask (page 1). The examiner does not explain why, if phase-shifting material were applied to the side of the substrate opposite to Shigetomi's phase-shifting portions, this light intensity equalization would be provided. Thus, it is not

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apparent from the examiner's argument why the applied references would have motivated one of ordinary skill in the art to combine their teachings such that a mask having phase-shifting material on both sides of a substrate is produced.

We therefore conclude that the examiner has not carried his burden of establishing a *prima facie* case of obviousness of appellant's claimed invention over Shigetomi and Okamoto. Consequently, the rejection of claims 1-7 under 35 U.S.C. ' 103 over these references is reversed.

*DECISION*

The rejections of claims 1-7 under 35 U.S.C. ' 103 as being unpatentable over Okamoto in view of Levenson and over Shigetomi in view of Okamoto are reversed.

*REVERSED*

BRADLEY R. GARRIS	)	
Administrative Patent Judge	)	
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	)	
	)	BOARD OF PATENT
CHUNG K. PAK	)	
Administrative Patent Judge	)	APPEALS AND
	)	
	)	INTERFERENCES

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TERRY J. OWENS )  
Administrative Patent Judge )



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